[prl,twocolumn,superscriptaddress,showpacs]revtex4
graphics bm amsmath
document
Typical entanglement in multi-qubit systems

Vivien M. Kendon Viv.Kendon@ic.ac.uk Optics Section, Blackett Laboratory, Imperial College, London, SW7 2BW, United Kingdom. Kae Nemoto School of Informatics, Dean Street, University of Wales, Bangor, LL57 1UT, United Kingdom. William J Munro Hewlett-Packard Laboratories, Filton Road, Stoke Gifford, Bristol, BS34 8QZ, United Kingdom.

5 June 2001

abstract Quantum entanglement and its paradoxical properties hold the key to an information processing revolution. Much attention has focused recently on the challenging problem of characterizing entanglement. Entanglement for a two qubit system is reasonably well understood, however, the nature and properties of multiple qubit systems are largely unexplored. We have found that typical pure states of N qubits are highly entangled but have decreasing amounts of pairwise entanglement as N increases. Above 6 qubits very few states have any pairwise entanglement, and generally, m-way entanglement disappears from a typical pure state of N qubits for $N2m+3$.